

Title (en)
SEMICONDUCTOR DEVICE AND MANUFACTURING METHOD THEREFOR

Title (de)
HALBLEITERBAUELEMENT UND HERSTELLUNGSVERFAHREN DAFÜR

Title (fr)
DISPOSITIF À SEMI-CONDUCTEUR ET SON PROCÉDÉ DE FABRICATION

Publication
EP 4213184 A4 20231108 (EN)

Application
EP 20959217 A 20201030

Priority
CN 2020125328 W 20201030

Abstract (en)
[origin: EP4213184A1] Embodiments of this application disclose a semiconductor device and a manufacturing method thereof. The semiconductor device may include a substrate, and an epitaxial layer and an electrode that are located on the substrate. The substrate has a diamond structure that longitudinally penetrates the substrate. The diamond structure may be longitudinally divided into a first diamond part and a second diamond part below the first diamond part. The first diamond part and the second diamond part have different lateral dimensions. Due to good thermal conductivity of the diamond part, the diamond structure that penetrates the substrate may form a longitudinal heat conduction channel, to improve heat dissipation performance of the semiconductor device. This helps effectively exert high power performance of the semiconductor device. In addition, the first diamond part and the second diamond part have different lateral dimensions, to help control the structure of the first diamond part and the second diamond part. In addition, heat dissipation performance and lattice matching between the epitaxial layer and the substrate are implemented, so that the epitaxial layer with higher quality and the semiconductor device with high performance can be obtained.

IPC 8 full level
H01L 21/335 (2006.01); **H01L 23/367** (2006.01); **H01L 23/373** (2006.01); **H01L 29/20** (2006.01); **H01L 29/778** (2006.01)

CPC (source: EP US)
H01L 23/3677 (2013.01 - EP); **H01L 23/3732** (2013.01 - EP US); **H01L 29/1602** (2013.01 - US); **H01L 29/2003** (2013.01 - US); **H01L 29/66462** (2013.01 - US); **H01L 29/7786** (2013.01 - US); **H01L 29/2003** (2013.01 - EP); **H01L 29/7786** (2013.01 - EP)

Citation (search report)
• [XA] US 2013248879 A1 20130926 - GAMBIN VINCENT [US], et al
• [XA] US 2014110722 A1 20140424 - KUB FRANCIS J [US], et al
• [A] WO 2018004565 A1 20180104 - INTEL CORP [US]
• [A] US 2015056763 A1 20150226 - HOBART KARL D [US], et al
• [A] CN 110223918 A 20190910 - UNIV XIDIAN
• See references of WO 2022088055A1

Designated contracting state (EPC)
AL AT BE BG CH CY CZ DE DK EE ES FI FR GB GR HR HU IE IS IT LI LT LU LV MC MK MT NL NO PL PT RO RS SE SI SK SM TR

Designated extension state (EPC)
BA ME

Designated validation state (EPC)
KH MA MD TN

DOCDB simple family (publication)
EP 4213184 A1 20230719; EP 4213184 A4 20231108; CN 115812254 A 20230317; JP 2023547925 A 20231114; US 2023268243 A1 20230824; WO 2022088055 A1 20220505

DOCDB simple family (application)
EP 20959217 A 20201030; CN 2020125328 W 20201030; CN 202080102849 A 20201030; JP 2023526332 A 20201030; US 202318310071 A 20230501